CPC COOPERATIVE PATENT CLASSIFICATION

F02C GAS-TURBINE PLANTS; AIR INTAKES FOR JET-PROPULSION PLANTS; CONTROLLING FUEL SUPPLY IN AIR-BREATHING JET-PROPULSION PLANTS (construction of turbines F01D ; jet-propulsion plants F02K ; construction of compressors or fans F04 ; gas-turbine combustion chambers F23R ; using gas turbines in compression refrigeration plants F25B 11/00; using gas-turbine plants in vehicles, see the relevant vehicle classes)

NOTE

This subclass covers:

- combustion product or hot gas turbine plants;
- internal combustion turbines or turbine plants;
- turbine plants in which the working fluid is an unheated, pressurised gas.

This subclass does not cover:

- steam turbine plants, which are covered by subclass F01K ;
- special vapour plants, which are covered by subclass F01K .
- { combined cycle plants, which are covered by subclass F01K 23/00 }

In this subclass, the following expression is used with the meaning indicated:

- "gas-turbine plants" covers all the subject matter of Note (1) above and covers also features of jet-propulsion plants common to gas-turbine plants.

Attention is drawn to the Notes preceding class F01 .

F02C 1/00 Gas-turbine plants characterised by the use of hot gases or unheated pressurised gases, as the working fluid (by the use of combustion product F02C 3/00, F02C 5/00)

F02C 1/002 . { using an auxiliary fluid }

F02C 1/005 . . { being recirculated }

F02C 1/007 . { combination of cycles }

F02C 1/02 . the working fluid being an unheated pressurised gas

F02C 1/04 . the working fluid being heated indirectly { (in a fluidised-bed combustor F02C 3/205) }

F02C 1/05 . . characterised by the type or source of heat, e.g. using nuclear or solar energy

F02C 1/06 . . . using reheated exhaust gas (F02C 1/08 takes precedence)

F02C 1/08 . . Semi-closed cycles

F02C 1/10 . . Closed cycles

F02C 1/105 . . . { construction; details }

F02C 3/00 Gas-turbine plants characterised by the use of combustion products as the

working fluid (generated by intermittent combustion F02C 5/00)

F02C 3/02 . using exhaust-gas pressure in a pressure exchanger to compress combustion-air (pressure exchangers per se F04F 13/00)

F02C 3/04 . having a turbine driving a compressor (power transmission arrangements F02C 7/36; control of working fluid flow F02C 9/16)

F02C 3/045 . . having compressor and turbine passages in a single rotor-module (F02C 3/073 takes precedence)

F02C 3/05 . . . the compressor and the turbine being of the radial flow type

F02C 3/055 . . the compressor being of the positive-displacement type

F02C 3/06 . . the compressor comprising only axial stages (F02C 3/10 takes precedence)

F02C 3/062 . . . { the turbine being of the radial-flow type }

F02C 3/064 . . . { the compressor having concentric stages }

F02C 3/067 . . . having counter-rotating rotors (F02C 3/073 takes precedence)

F02C 3/073 . . . the compressor and turbine stages being concentric

F02C 3/08 . . the compressor comprising at least one radial stage (F02C 3/10 takes precedence)

F02C 3/085 . . . { the turbine being of the radial-flow type (radial-radial) (F02C 3/05 takes precedence) }

F02C 3/09 . . . of the centripetal type

F02C 3/10 . . with another turbine driving an output shaft but not driving the compressor

F02C 3/103 . . . { the compressor being of the centrifugal type }

F02C 3/107 . . with two or more rotors connected by power transmission

F02C 3/113 . . . with variable power transmission between rotors

F02C 3/13 . . having variable working fluid interconnections between turbines or compressors or stages of different rotors { (controlling flow ratio between different flows of multi-flow jet-propulsion plant, e.g. ducted fan F02K 3/075) }

F02C 3/14 . characterised by the arrangement of the combustion chamber in the plant (combustion chambers per se F23R ; F02C 3/205 takes precedence)

F02C 3/145 . . { the combustion chamber being in the reverse flow-type }

F02C 3/16 . . the combustion chambers being formed at least partly in the turbine rotor { or in an other rotating part of the plant }

F02C 3/165 . . . { the combustion chamber contributes to the driving force by creating reactive thrust }

F02C 3/20 . using a special fuel, oxidant, or dilution fluid to generate the combustion products

F02C 3/205 . . { in a fluidised-bed combustor (in combination with a steam cycle see F01K 23/061; fluidised-bed apparatus in general B01J 8/18; fluidised-bed combustors in general F23C 11/02) }

F02C 3/22 . . the fuel or oxidant being gaseous at standard temperature and pressure (F02C 3/28 takes precedence)

F02C 3/24 . . the fuel or oxidant being liquid at standard temperature and pressure

F02C 3/26 . . the fuel or oxidant being solid or pulverulent, e.g. in slurry or suspension

F02C 3/28 . . . using a separate gas producer for gasifying the fuel before combustion

F02C 3/30 . . Adding water, steam or other fluids { for influencing combustion, e.g. to obtain cleaner exhaust gases (F02C 7/141, F02C 7/30, F01D 21/00, F01K 21/04, F23D 11/10 take precedence) }

F02C 3/305 . . . { Increasing the power, speed, torque or efficiency of a gas turbine or the thrust of a turbojet engine by injecting or adding water, steam or other fluids (F01K 21/04 takes precedence) }

F02C 3/32 . Inducing air flow by fluid jet, e.g. ejector action

F02C 3/34 . with recycling of part of the working fluid, i.e. semi-closed cycles with combustion products in the closed part of the cycle

F02C 3/36 . Open cycles

F02C 3/365 . . { a part of the compressed air being burned, the other part being heated indirectly (in a fluidised-bed combustor F02C 3/205) }

F02C 5/00 **Gas-turbine plants characterised by the working fluid being generated by intermittent combustion**

F02C 5/02 . characterised by the arrangement of the combustion chamber in the chamber in the plant (combustion chambers per se F23R)

F02C 5/04 . . the combustion chambers being formed at least partly in the turbine rotor

F02C 5/06 . the working fluid being generated in an internal-combustion gas generated of the positive-displacement type having essentially no mechanical power output (internal-combustion engines with prolonged expansion using exhaust gas turbines F02B)

F02C 5/08 . . the gas generator being of the free-piston type

F02C 5/10 . the working fluid forming a resonating or oscillating gas column, i.e. the combustion chambers having no positively actuated valves, e.g. using Helmholtz effect

F02C 5/11 . . using valveless combustion chambers

F02C 5/12 . the combustion chambers having inlet or outlet valves, e.g. Holzwarth gas-turbine plants

F02C 6/00 **Plural gas-turbine plants; Combinations of gas-turbine plants with other apparatus** (aspects predominantly concerning such apparatus, see the relevant classes for the apparatus)**; Adaptations of gas- turbine plants for special use**

F02C 6/003 . { Gas-turbine plants with heaters between turbine stages }

F02C 6/006 . { Open cycle gas-turbine in which the working fluid is expanded to a pressure below the atmospheric pressure and then compressed to atmosperic pressure }

F02C 6/02 . Plural gas-turbine plants having a common power output

F02C 6/04 . Gas-turbine plants providing heated or pressurised working fluid for other apparatus, e.g. without mechanical power output (F02C 6/18 takes precedence; { for a fluidised-bed combustor F02C 3/205 })

F02C 6/06 . . providing compressed gas (F02C 6/10 takes precedence)

F02C 6/08 . . . the gas being bled from the gas-turbine compressor

F02C 6/10 . . supplying working fluid to a user, e.g. a chemical process, which returns working fluid to a turbine of the plant

F02C 6/12 . . . Turbochargers, i.e. plants for augmenting mechanical power output of internal-combustion piston engines by increase of charge pressure

F02C 6/14 . Gas-turbine plants having means for storing energy, e.g. for meeting peak loads

F02C 6/16 . . for storing compressed air

F02C 6/18 . Using the waste heat of gas-turbine plants outside the plants themselves, e.g. gas-turbine power heat plants (using waste heat as source of energy for refrigeration plants F25B 27/02; using the waste heat of a gasturbine for steam generation or in a steam cycle see F01K 23/10)

F02C 6/20 . Adaptations of gas-turbine plants for driving vehicles

F02C 6/203 . . { the vehicles being waterborne vessels }

F02C 6/206 . . { the vehicles being airscrew driven }

F02C 7/00 **Features, components parts, details or accessories, not provided for in, or of interest apart form groups F02C 1/00 to F02C 6/00; Air intakes for jet-propulsion plants** (controlling F02C 9/00)

F02C 7/04 . Air intakes for gas-turbine plants or jet-propulsion plants

F02C 7/042 . . having variable geometry

F02C 7/045 . . having provisions for noise suppression

F02C 7/047 . . Heating to prevent icing

F02C 7/05 . . having provisions for obviating the penetration of damaging objects or particles

F02C 7/052 . . . with dust-separation devices

F02C 7/055 . . . with intake grids, screens or guards

F02C 7/057 . . Control or regulation (conjointly with fuel supply control F02C 9/50, with nozzle area control F02K 1/16)

F02C 7/06 . Arrangements of bearings (bearings F16C); Lubricating ({ of turbo machines F01D 25/18; of machines or } engines in general F01M)

F02C 7/08 . Heating air supply before combustion, e.g. by exhaust gases

F02C 7/10 . . by means of regenerative heat-exchangers

F02C 7/105 . . . of the rotary type (rotary heat exchangers per se F28D)

F02C 7/12 . Cooling of plants (of component parts, see the relevant subclasses, e.g. F01D ; cooling of engines in general F01P)

F02C 7/125 . . { by partial arc admission of the working fluid or by intermittent admission of working and cooling fluid }

F02C 7/14 . . of fluids in the plant, { e.g. lubricant or fuel (F02C 7/185 takes precedence) }

F02C 7/141 . . . of working fluid

F02C 7/143 . . . . before or between the compressor stages

F02C 7/1435 . . . . . { by water injection }

F02C 7/16 . . characterised by cooling medium

F02C 7/18 . . . the medium being gaseous, e.g. air { (F02C 7/125 takes precedence) }

F02C 7/185 . . . . { Cooling means for reducing the temperature of the cooling air or gas }

F02C 7/20 . Mounting or supporting of plant; Accomodating heat expansion or creep

F02C 7/22 . Fuel supply systems

F02C 7/222 . . { Fuel flow conduits, e.g. manifolds }

F02C 7/224 . . Heating fuel before feeding to the burner

F02C 7/228 . . Dividing fuel between various burners

F02C 7/232 . . Fuel valves { (control of fuel supply by means of fuel metering valves F02C 9/263) }; Draining valves or systems (valves in general F16K)

F02C 7/236 . . Fuel delivery systems comprising two or more pumps

F02C 7/2365 . . . { comprising an air supply system for the atomisation of fuel }

F02C 7/24 . Heat or noise insulation (air intakes having provisions for noise suppression F02C 7/045; turbine exhaust heads, chambers, or the like F01D 25/30; silencing nozzles of jet-propulsion plants F02K 1/00)

F02C 7/25 . . Fire protection or prevention (in general A62)

F02C 7/26 . Starting; Ignition

F02C 7/262 . . Restarting after flame-out

F02C 7/264 . . Ignition

F02C 7/266 . . . Electric (sparking plugs H01T)

F02C 7/268 . . Starting drives for the rotor, { acting directly on the rotor of the gas turbine to be started }

F02C 7/27 . . . Fluid drives (turbine starters F02C 7/277)

F02C 7/272 . . . . generated by cartridges

F02C 7/275 . . . Mechanical drives

F02C 7/277 . . . . the starter being a { separate } turbine

F02C 7/28 . Arrangement of seals

F02C 7/30 . Preventing corrosion { or unwanted deposits } in gas-swept spaces

F02C 7/32 . Arrangement, mounting, or driving, of auxiliaries

F02C 7/36 . Power transmission arrangements between the different shafts of the gas turbine plant, or between the gas-turbine plant and the power user ({ F02C 3/107 to F02C 3/13 and } F02C 7/32 take precedence; couplings for transmitting rotation F16D ; gearing in general F16H)

F02C 9/00 **Controlling gas-turbine plants; Controlling fuel supply in air- breathing jet-propulsion plants** (controlling air intakes F02C 7/057; controlling turbines F01D ; controlling compressors F04D 27/00; controlling in general G05)

F02C 9/16 . Control of working fluid flow (F02C 9/48 takes precedence; control of air-intake flow F02C 7/057)

F02C 9/18 . . by bleeding, bypassing or acting on variable working fluid interconnections between turbines or compressors or their stages { (F02C 3/113 takes

) }

F02C 9/20 . . by throttling; by adjusting vanes

F02C 9/22 . . . by adjusting turbine vanes

F02C 9/24 . . Control of the pressure level in closed cycles

F02C 9/26 . Control of fuel supply (F02C 9/48 takes precedence; fuel valves F02C 7/232)

F02C 9/263 . . { by means of fuel metering valves }

F02C 9/266 . . { specially adapted for gas turbines with intermittent fuel injection }

F02C 9/28 . . Regulating systems responsive to plant or ambient parameters, e.g. temperature, pressure, rotor speed (F02C 9/30 to F02C 9/38, F02C 9/44 take precedence)

F02C 9/285 . . . { Mechanical command devices linked to the throttle lever }

F02C 9/30 . . characterised by variable fuel pump output

F02C 9/32 . . characterised by throttling of fuel (F02C 9/38 takes precedence)

F02C 9/34 . . . Joint control of separate flows to main and auxiliary burners

F02C 9/36 . . characterised by returning of fuel to sump (F02C 9/38 takes precedence)

F02C 9/38 . . characterised by throttling and returning of fuel to sump

F02C 9/40 . . specially adapted to the use of a special fuel or a plurality of fuels

F02C 9/42 . . specially adapted for the control of two or more plants simultaneously

F02C 9/44 . . responsive to the speed of aircraft, e.g. Mach number control, optimisation of fuel consumption

F02C 9/46 . . Emergency fuel control

F02C 9/48 . Control of fuel supply conjointly with another control of the plant (with nozzle section control F02K 1/17)

F02C 9/50 . . with control of working fluid flow

F02C 9/52 . . . by bleeding or by-passing the working fluid

F02C 9/54 . . . by throttling the working fluid, by adjusting vanes

F02C 9/56 . . with power transmission control

F02C 9/58 . . . with control of a variable-pitch propeller